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Promoting Sustainability in the Inyo-Mono Region:  
Understanding Regional Groundwater Resources and  
Upgrading Infrastructure in Disadvantaged  
Community Water Systems

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## Introduction

Attachment 8 contains analyses for the four projects included in the Inyo-Mono Round 2 Implementation Grant proposal. Given the diversity of projects, their scopes and budgetary sizes, along with the guidance provided within the DWR Proposal Solicitation Package, different methodological approaches were used for different projects. In summary, all four projects benefit disadvantaged communities, and all four projects have total costs under \$1 million. Two projects address critical needs for small water systems and associated antiquated infrastructure, and two projects support a recognized regional need to enhance knowledge and management of groundwater resources supporting local communities and threatened flora and fauna. All projects have identified non-monetized benefits. Specific approaches and associated tables used for each of the project analyses are specified under each of the respective projects below.

## Big Pine Fire Protection Improvement Project

Big Pine Fire Protection Improvement Project directly benefits a DAC and Native American tribe and has quantifiable benefits and annual costs. Additionally, there are non-monetized benefits being claimed.

Analyses included: Non-monetized benefits (Table 12); quantifiable and monetized physical benefits (Table 15); annual costs (Table 19). Further justification for Table 15 can be found in Attachment 7: Technical Justification.

<b>Table 12 – Non-monetized Benefits Checklist</b>		
<b>No.</b>	<b>Question</b>	<b>Enter “Yes”, “No” or “Neg”</b>
	<b>Community/Social Benefits</b>	
	<b>Will the proposal:</b>	
<b>1</b>	<b>Provide education or technology benefits?</b>	<b>No</b>
<b>2</b>	<b>Provide social recreation or access benefits?</b>	<b>No</b>
<b>3</b>	<b>Help avoid, reduce or resolve various public water resources conflicts?</b>	<b>No</b>
<b>4</b>	<b>Promote social health and safety?</b>	<b>Yes</b>
	<p>a) Big Pine Paiute Tribe currently has a housing shortage for Tribal members. This shortage has resulted in overcrowding in current structures and homelessness. Protecting already-existing homes on the reservation from catastrophic fire will help prevent more overcrowding and homelessness. Furthermore, this project will ensure fire protection for future new homes built on the reservation, thus further alleviating the housing shortage.</p> <p>b) In addition to reducing structural damage from catastrophic fires, improved fire prevention infrastructure will also directly improve prevention of fire-related injuries to community members.</p>	
<b>5</b>	<b>Have other social benefits?</b>	<b>Yes</b>
	<p>a) This project protects a federally-recognized Native American Tribe, which is also a disadvantaged community. Protecting Big Pine Paiute reservation land and structures from fire will help to preserve important tribal cultural resources (such as Big Pine Creek) and artifacts.</p> <p>b) This project involves a commitment on the part of the BPPT and the Big Pine Community Services District to work together in a cooperative and collaborative manner. Such regional collaboration provides an explicit example of how disadvantaged communities, Native American Tribes and others can work together and leverage skills and resources necessary to addressing pressing needs.</p>	

<b>Table 12 – Non-monetized Benefits Checklist</b>		
<b>No.</b>	<b>Question</b>	<b>Enter “Yes”, “No” or “Neg”</b>
	<b>Environmental Stewardship Benefits</b>	
	<b>Will the proposal:</b>	
<b>6</b>	<b>Benefit wildlife or habitat in ways that were not quantified in Attachment 7?</b>	<b>Yes</b>
	a) Fire on the Big Pine Paiute Tribe reservation or within the Big Pine Community Services District service area can impact Big Pine Creek, which flows through both communities. Sediment deposited into the creek post-fire impacts fish and amphibian habitat. This project is aimed at reducing the numbers and severity of fires occurring in the communities, thereby reducing fire-related impacts to the portion of Big Pine Creek flowing through the reservation and the town.	
<b>7</b>	<b>Improve water quality in ways that were not quantified in Attachment 7?</b>	<b>No</b>
<b>8</b>	<b>Reduce net emissions in ways that were not quantified in Attachment 7?</b>	<b>No</b>
<b>9</b>	<b>Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?</b>	<b>No</b>
	<b>Sustainability Benefits</b>	
	<b>Will the proposal:</b>	
<b>10</b>	<b>Improve the overall, long-term management of California groundwater resources?</b>	<b>No</b>
<b>11</b>	<b>Reduce demand for net diversions for the regions from the Delta?</b>	<b>No</b>
<b>12</b>	<b>Provide a long-term solution in place of a short-term one?</b>	<b>No</b>
<b>13</b>	<b>Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?</b>	<b>No</b>
<b>14</b>	<b>Improve water supply reliability in ways not quantified in Attachment 7?</b>	<b>Yes</b>
	a) Currently, fire flow is either inadequate or unavailable on the Big Pine Paiute reservation and in the town of Big Pine due to outdated infrastructure and fire hydrants placed too far apart. This project, along with a related project to increase water main size on the Big Pine Paiute reservation, will substantially improve the water supply available for fire protection for both communities.	
<b>15</b>	<b>Other (If the above listed categories do not apply, provide non-monetized benefit description)?</b>	<b>No</b>

The results of the monetized benefit-cost analysis shown below demonstrates that with a project investment of \$294,189, avoided costs would equate to \$3,617,195 or a ratio of benefits-to-costs equating to just over 12:1.

**Table 15 – Annual Benefit**

(All benefits should be in 2012 dollars)

**Project: Big Pine Fire Protection Improvement Project**

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit \$ Value <sup>(1)</sup>	Annual \$ Value <sup>(1)</sup> (f) x (g)	Discount Factor <sup>(1)</sup>	Discounted Benefits <sup>(1)</sup> (h) x (i)
2012	a								
	b								
	c								
2013	..								
2014	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.89	\$466,240
2015	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.84	\$440,047
2016	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.792	\$414,901
2017	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.747	\$391,327
2018	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.705	\$369,325
2019	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.665	\$348,370
2020	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.627	\$328,463
2021	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.592	\$310,128
2022	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.558	\$292,317
Last Year of Project Life	a	Homes Destroyed by Fire	2.5	0.25	2.25	\$232,829	\$523,865	0.527	\$276,077
<b>Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)</b>									<b>\$3,637,195</b>
<b>Comments: Avoided Cost Benefit</b>									

**Table 19 – Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Project: Big Pine Fire Protection Improvement Project**

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost <sup>(1)</sup>	Annual Costs <sup>(2)</sup>					Discounting Calculations		
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012	\$ -								1.000	\$-
2013	\$275,317.00							\$275,317.00	0.943	\$259,623.93
2014				\$1,000	\$4,000			\$5,000	0.890	\$4,450.00
2015				\$1,000	\$4,000			\$5,000	0.840	\$4,200.00
2016				\$1,000	\$4,000			\$5,000	0.792	\$3,960.00
2017				\$1,000	\$4,000			\$5,000	0.747	\$3,735.00
2018				\$1,000	\$4,000			\$5,000	0.705	\$3,525.00
2019				\$1,000	\$4,000			\$5,000	0.665	\$3,325.00
2020				\$1,000	\$4,000			\$5,000	0.627	\$3,135.00
2021				\$1,000	\$4,000			\$5,000	0.592	\$2,960.00
2022				\$1,000	\$4,000			\$5,000	0.558	\$2,790.00
Last Year of Project Life				\$1,000	\$4,000			\$5,000	0.497	\$2,485.00
<b>Total Present Value of Discounted Costs (Sum of column (j))</b>										<b>\$294,188.93</b>
<b>Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries</b>										

## Amargosa Basin Water, Ecosystem Sustainability, and Disadvantaged Communities Project

This project benefits DACs in the southeastern portion of the Inyo-Mono region and is a combination of implementation and feasibility efforts to better understand groundwater dynamics in the Amargosa Basin. Exact physical benefits are difficult to quantify at this stage, but the study will provide the means to do so. Non-monetized benefits are being claimed.

Analyses included: Non-monetized benefits (Table 12); Annual costs (Table 19).

<b>Table 12 – Non-monetized Benefits Checklist</b>		
<b>No.</b>	<b>Question</b>	<b>Enter “Yes”, “No” or “Neg”</b>
	<b>Community/Social Benefits</b>	
	<b>Will the proposal:</b>	
<b>1</b>	<b>Provide education or technology benefits?</b>	<b>Yes</b>
	a) The Amargosa Conservancy, a local non-profit based in Shoshone, California, will provide the community extensive information about the results of this project. Other local events, such as the annual Devil’s Hole Conference, will also provide excellent communication and educational opportunities.	
	b) New studies—to be augmented by this project-- have indicated that the existing conceptual hydrological model for the Amargosa basin is flawed. This work will be used to develop a stronger conceptual model that will provide educational benefits to researchers, agency land managers, and communities.	
<b>2</b>	<b>Provide social recreation or access benefits?</b>	<b>Yes</b>
	a) The economies of the communities in the Amargosa watershed depend on water resources for recreational activities such as visiting hot springs, hiking, and bird watching, and for agriculture. A deeper understanding of the natural patterns and trends in groundwater and surface water resources, along with potential anthropogenic impacts to those resources, will help to protect recreational access and agricultural interests, and promote local livelihoods.	
<b>3</b>	<b>Help avoid, reduce or resolve various public water resources conflicts?</b>	<b>Yes</b>
	a) Uncertainty about the water resources associated with region leads to greater risk in land management activities. Currently conflicts exist related to water resources because of this uncertainty. Local residents and environmental organizations have opposed proposed industrial-scale alternative energy projects because of water use. This project will develop a stronger conceptual model of water resources and remove a degree of that uncertainty that is leading to that conflict.	

**Table 12 – Non-monetized Benefits Checklist**

No.	Question	Enter “Yes”, “No” or “Neg”
4	<b>Promote social health and safety?</b>	<b>Yes</b>
	a) The project will assist the local disadvantaged communities find locations for safer sources of drinking water and also provide water resources for fire safety.	
5	<b>Have other social benefits?</b>	<b>Yes</b>
	a) The economic engine of the community is water. The water supply of the towns of Tecopa, Tecopa Hot Springs and Shoshone is derived from spring water. The agricultural practices in the basin (date palms) use water from spring flow. A principal economic engine of the region is tourism related to the hot springs at Tecopa. These studies will add to security for the water supply and ecological resources for the region.	
	b) This project will also result in a local community that is more informed about its water resources and related issues.	
	<b>Environmental Stewardship Benefits</b>	
	<b>Will the proposal:</b>	
6	<b>Benefit wildlife or habitat in ways that were not quantified in Attachment 7?</b>	<b>No</b>
7	<b>Improve water quality in ways that were not quantified in Attachment 7?</b>	<b>Yes</b>
	a) Existing well and hot spring water in the study area generally contains elevated arsenic concentrations. A result of this study will be greater coverage of water quality data and the potential identification of new areas of potable groundwater.	
8	<b>Reduce net emissions in ways that were not quantified in Attachment 7?</b>	<b>No</b>
9	<b>Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?</b>	<b>No</b>
	<b>Sustainability Benefits</b>	
	<b>Will the proposal:</b>	
10	<b>Improve the overall, long-term management of California groundwater resources?</b>	<b>Yes</b>
	a) This project is part of an Inyo-Mono IRWM region-wide effort to better understand and manage groundwater resources in the region, which comprise the large majority of water resources to people living in and visiting the region.	
	b) This study is necessary to understand and protect the water resources of this important ecosystem and of the local disadvantaged communities. Without the proposed project, the local economy and the federally-designated Amargosa Wild and Scenic River will be at risk.	
11	<b>Reduce demand for net diversions for the regions from the Delta?</b>	<b>No</b>
12	<b>Provide a long-term solution in place of a short-term one?</b>	<b>Yes</b>

**Table 12 – Non-monetized Benefits Checklist**

No.	Question	Enter “Yes”, “No” or “Neg”
	a) The three central goals which this project is designed to serve are to support a sustainably managed human water supply, a sustainable water dependent ecosystem, and a sustainable local economy in the Shoshone-Tecopa-Tecopa Hot Springs area of southeast Inyo County. This study will make significant progress towards those goals. The project will develop an improved understanding of the Amargosa River Basin, including the nature of the shallow and deep aquifers, protection from and identification of impacts from regional overdraft conditions and proposed water development projects, and the viability of Amargosa River and its source springs.	
	b) This is part of a long-term collaborative effort between the Amargosa Conservancy, Inyo County, The Nature Conservancy, the U.S. Bureau of Land Management, and the U.S. Geological Survey to understand this important hydrologic region, and to provide more effective management of those resources. Long-term sustainability of resources is at the heart of this effort.	
<b>13</b>	<b>Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?</b>	<b>No</b>
<b>14</b>	<b>Improve water supply reliability in ways not quantified in Attachment 7?</b>	<b>Yes</b>
	a) At this point, it is not possible to quantify potential additional water supplies identified as a result of this project, but the overall goal of this study and the larger effort is to improve water supply sustainability for the Amargosa River Basin and the DACs therein.	
<b>15</b>	<b>Other (If the above listed categories do not apply, provide non-monetized benefit description)?</b>	<b>No</b>

**Table 19 – Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Project: Amargosa Basin Water, Ecosystem Sustainability, and Disadvantaged Communities Project**

			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
<b>2012</b>									1.000	<b>0</b>
<b>2013-2015</b>	\$749,649.00	\$749,649.00						\$749,649.00	0.943	\$706,919
<b>2016</b>			\$2,000.00	\$48,000.00	\$ 1,000.00			\$51,000.00	0.792	\$40,392
<b>2017</b>			\$2,000.00	\$48,500.00	\$ 1,000.00			\$51,500.00	0.747	\$38,471
<b>2018</b>			\$2,000.00	\$49,700.00	\$ 1,000.00			\$52,700.00	0.705	\$37,154
<b>2019</b>			\$2,000.00	\$50,500.00	\$ 1,000.00			\$53,500.00	0.665	\$35,578
<b>Last Year of Project Life</b>	2019 (see comments)								...	
<b>Total Present Value of Discounted Costs (Sum of column (j))</b> <b>Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries</b>										<b>\$858,513</b>

**Comments:** Hydrologic monitoring will be ongoing after 2019; sources of funds to support post-project work are yet to be determined.

## Inyo County Disadvantaged Communities Meters Project

This project directly benefits three disadvantaged communities in Inyo County (Laws, Independence, and Lone Pine) and has a total budget of less than \$1 million. As such, a cost-effectiveness approach was used in this analysis as allowed for in the Proposal Solicitation Package. Quantifiable physical benefits are claimed based on reduced operational and management expenditures and serve as primary justification for the proposed project. Non-monetized benefits are also being claimed.

Analyses included: Cost-effectiveness (Table 11); Non-monetized benefits (Table 12); Annual costs (Table 19). Note, in Attachment 7, technical justification for claimed cost savings was presented as Part B of Table 9 and the associated narrative and tables.

<b>Table 11 – Statement of Cost Effectiveness</b>	
<b>Project Name: Inyo County Disadvantaged Communities Meters Project</b>	
<b>Question 1:</b> Types of benefits provided	Upgrading old and non-functional infrastructure will lead to the following benefits: more accurate quantification of water use and associated billing, and reduced staff time required for meter reading and billing, resulting in more efficient water system operations for three small disadvantaged communities in Inyo County. A second benefit is that more accurate water consumption data will provide the basis for a rate increase study, which is a recognized need of these three systems. A rate study will be a key component of developing a long-term capital improvement plan to ensure the long-term management and sustainability of the systems.
<b>Question 2:</b> Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified?	Yes
If no, why?	
If yes, list the methods (including the proposed project) and estimated costs.	No project = \$0; Analog meters = \$732,799; Digital meters = \$913,433.
<b>Question 3:</b> If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.	Although installing digital meters is a higher project cost up front, analog meters would require more staff time to travel the systems, read meters, and bill ratepayers, resulting in higher overall operational costs. Over the life of the project (20 years), it is expected that just under \$230,000 will be saved using digital/AMR meters versus analog meters, including the initial project cost. Annual cost savings are calculated at just over \$11,000/year in O & M

	expenses for digital vs. analog.
<b>Comments:</b>	Present value of each project and their respective Capital, Operations, and Maintenance costs over 20 years in 2012 dollars is: Analog: \$1,193,620 AMR: \$966,754

<b>Table 12 – Non-monetized Benefits Checklist</b>		
<b>No.</b>	<b>Question</b>	<b>Enter “Yes”, “No” or “Neg”</b>
	<b>Community/Social Benefits</b>	
	<b>Will the proposal:</b>	
<b>1</b>	<b>Provide education or technology benefits?</b>	<b>Yes</b>
	a) Installing new water meters in the three communities will yield a more accurate measurement of actual water consumption. This more accurate information on water consumption will appear on ratepayers' bills, providing them with a more realistic view of their actual water use compared with the current dysfunctional meters.	
	b) The replacement of meters in the three water systems will provide a case study of water infrastructure upgrades in small water systems. The managers of these systems will share successes and lessons learned with other small and/or disadvantaged communities, both within and outside the Inyo-Mono IRWM region, looking to upgrade water infrastructure.	
<b>2</b>	<b>Provide social recreation or access benefits?</b>	<b>No</b>
<b>3</b>	<b>Help avoid, reduce or resolve various public water resources conflicts?</b>	<b>Yes</b>
	a) There is currently distrust between ratepayers and the water operator regarding accurate reading of meters. This project will help dispel that distrust by increasing the confidence of the water operator in the meter reading and billing processes, and of the ratepayers in the bills they receive and the water for which they are being charged. The new meters, combined with the handheld meter reading devices and new billing software, will provide a new level of customer service to ratepayers.	
	b) More accurate water consumption data will provide a baseline from which to embark upon a rate study and begin to build a capital improvement plan/fund for these three systems.	
<b>4</b>	<b>Promote social health and safety?</b>	<b>No</b>
<b>5</b>	<b>Have other social benefits?</b>	<b>Yes</b>
	a) This project specifically benefits three historic and disadvantaged communities in Inyo County that have outdated and dysfunctional water and wastewater infrastructure. Replacement of water meters is an early step in addressing these infrastructure needs.	
	b) This project will help to bring these three water systems to the same level of service experienced by some of the wealthier surrounding communities.	

<b>Table 12 – Non-monetized Benefits Checklist</b>		
<b>No.</b>	<b>Question</b>	<b>Enter “Yes”, “No” or “Neg”</b>
	<b>Environmental Stewardship Benefits</b>	
	<b>Will the proposal:</b>	
<b>6</b>	<b>Benefit wildlife or habitat in ways that were not quantified in Attachment 7?</b>	<b>No</b>
<b>7</b>	<b>Improve water quality in ways that were not quantified in Attachment 7?</b>	<b>No</b>
<b>8</b>	<b>Reduce net emissions in ways that were not quantified in Attachment 7?</b>	<b>Yes</b>
	a) There will be a small but unknown amount of reduction in greenhouse gas emissions through this project. Because fewer days will be required to read new AMR meters than the current analog meters, this results in fewer vehicle trips to each community for the purpose of meter reading. The fewer miles driven will save fuel and thus reduce greenhouse gases emitted from meter-reading activities.	
<b>9</b>	<b>Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?</b>	<b>No</b>
	<b>Sustainability Benefits</b>	
	<b>Will the proposal:</b>	
<b>10</b>	<b>Improve the overall, long-term management of California groundwater resources?</b>	<b>Yes</b>
	a) More accurate water consumption data will provide a basis for better decision-making regarding operations and management of these three water systems, all of which solely rely on groundwater as the only water source.	
<b>11</b>	<b>Reduce demand for net diversions for the regions from the Delta?</b>	<b>No</b>
<b>12</b>	<b>Provide a long-term solution in place of a short-term one?</b>	<b>Yes</b>
	a) There are no viable short-term solutions to the problem of incorrect metering in these three systems. The installation of new water meters will address the problem long-term in that the life expectancy of AMR meters is 20 years.	
	b) The proposed project also promotes a long-term vision of the operations and management of the three water systems, such as through upgrading billing software, which will be continued in future infrastructure upgrade projects. Ultimately, this will help to ensure the long-term sustainability of the three systems.	
<b>13</b>	<b>Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?</b>	<b>Yes</b>
	a) As explained above, new AMR meters will require less transportation for meter reading, thus reducing the amount of vehicle fuel used by Inyo County, at least for the expected life of the meters (20 years).	
<b>14</b>	<b>Improve water supply reliability in ways not quantified in Attachment 7?</b>	<b>No</b>

<b>Table 12 – Non-monetized Benefits Checklist</b>		
<b>No.</b>	<b>Question</b>	<b>Enter “Yes”, “No” or “Neg”</b>
<b>15</b>	<b>Other (If the above listed categories do not apply, provide non-monetized benefit description)?</b>	<b>No</b>

**Table 19 – Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Project: Inyo County Disadvantaged Communities Meters Project**

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost <sup>(1)</sup>	Annual Costs <sup>(2)</sup>						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012									1.000	
2013	\$913,433.00							\$913,433	0.943	\$861,367.32
2014				\$6,280		\$3,535		\$9,740	0.890	\$8,668.60
2015				\$6,280		\$3,535		\$9,740	0.840	\$8,181.60
2016				\$6,280		\$3,535		\$9,740	0.792	\$7,714.08
2017				\$6,280		\$3,535		\$9,740	0.747	\$7,275.78
2018				\$6,280		\$3,535		\$9,740	0.705	\$6,866.70
2019				\$6,280		\$3,535		\$9,740	0.665	\$6,477.10
2020				\$6,280		\$3,535		\$9,740	0.627	\$6,106.98
2021				\$6,280		\$3,535		\$9,740	0.592	\$5,766.08
2022				\$6,280		\$3,535		\$9,740	0.558	\$5,434.92
2023				\$6,280		\$3,535		\$9,740	0.527	\$5,132.98
2024				\$6,280		\$3,535		\$9,740	0.497	\$4,840.78
2025				\$6,280		\$3,535		\$9,740	0.469	\$4,568.06
2026				\$6,280		\$3,535		\$9,740	0.442	\$4,305.08
2027				\$6,280		\$3,535		\$9,740	0.417	\$4,061.58
2028				\$6,280		\$3,535		\$9,740	0.394	\$3,837.56
2029				\$6,280		\$3,535		\$9,740	0.371	\$3,613.54
2030				\$6,280		\$3,535		\$9,740	0.350	\$3,409.00
2031				\$6,280		\$3,535		\$9,740	0.331	\$3,223.94
2032				\$6,280		\$3,535		\$9,740	0.312	\$3,038.88
Last Year of Project Life				\$6,280		\$3,535		\$9,740	0.294	\$2,863.56
<b>Total Present Value of Discounted Costs (Sum of column (j))</b>										<b>\$966,754.12</b>
<b>Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries</b>										

## Indian Wells Valley Groundwater Basin Brackish Water Resources Study

This project benefits communities, including DACs, in the southern portion of the Inyo-Mono region with the goal of identifying domestic water supplies through a better understanding of groundwater quality and supply in the Indian Wells Valley. Exact physical benefits are difficult to quantify at this stage, but the study will provide the means to do so. Non-monetized benefits are being claimed.

Analyses included: Non-monetized benefits (Table 12); Annual costs (Table 19).

<b>Table 12 – Non-monetized Benefits Checklist</b>		
<b>No.</b>	<b>Question</b>	<b>Enter “Yes”, “No” or “Neg”</b>
	<b>Community/Social Benefits</b>	
	<b>Will the proposal:</b>	
<b>1</b>	<b>Provide education or technology benefits?</b>	<b>Yes</b>
	a) The methods used to address identified data gaps, such as geophysical surveys and monitoring wells, as well as those used to update the groundwater basin model, utilize modern technologies, the utility and results of which will be shared with the public and other water systems requiring similar tools.	
	b) Throughout the course of the project, presentations will be made by IWWVD and the consultant about the progress and results of the Brackish Water Resources Study. These presentations will primarily be given at publicly-noticed IWWVD and Indian Wells Valley Cooperative Groundwater Management Group meetings, with the goal of educating Indian Wells Valley residents about the future of their water source. Presentations will also be given to the Inyo-Mono Regional Water Management Group.	
<b>2</b>	<b>Provide social recreation or access benefits?</b>	<b>No</b>
<b>3</b>	<b>Help avoid, reduce or resolve various public water resources conflicts?</b>	<b>Yes</b>
	a) Uncertainty about the location and quality of the groundwater resource in the Indian Wells Valley has led to distrust among certain water users. Providing a better understanding of the nature of the groundwater in the basin (amount and quality) will help to reduce uncertainty and promote data-driven solutions.	
	b) Developing a new water source through treating brackish water may help to delay adjudication of the basin.	
<b>4</b>	<b>Promote social health and safety?</b>	<b>No</b>
<b>5</b>	<b>Have other social benefits?</b>	<b>Yes</b>
	a) This groundwater resources study will provide another avenue through which members of the Indian Wells Valley Cooperative Groundwater Management Group and other stakeholders, including private well	

**Table 12 – Non-monetized Benefits Checklist**

No.	Question	Enter “Yes”, “No” or “Neg”
	<p>operators, can continue to communicate and collaborate about the future of groundwater resources in the basin.</p> <p>b) Although this study is being sponsored by the Indian Wells Valley Water District, other communities in the Indian Wells Valley basin will benefit from its findings, including the disadvantaged communities of Inyokern, Searles Valley (Trona, Argus, Pioneer Point, West End, and Valley Wells), and Pearsonville. Information gathered from this study will ultimately help to secure the long-term water supply reliability for all the communities and residents in the valley.</p>	
	<b>Environmental Stewardship Benefits</b>	
	<b>Will the proposal:</b>	
6	<b>Benefit wildlife or habitat in ways that were not quantified in Attachment 7?</b>	<b>No</b>
7	<b>Improve water quality in ways that were not quantified in Attachment 7?</b>	<b>Yes</b>
	<p>One of the components of this study is to understand and map areas of varying water quality, from fresh water to brackish water. A better understanding of the water quality of the Indian Wells Valley basin will provide the information necessary to plan and build an appropriate treatment plant, ultimately providing Indian Wells Valley residents with another source of high-quality water. The study will help to prevent further un-treated use of degraded water supplies that are resulting from overdraft and a general lack of knowledge about groundwater resources in the basin.</p>	
8	<b>Reduce net emissions in ways that were not quantified in Attachment 7?</b>	<b>No</b>
9	<b>Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?</b>	<b>No</b>
	<b>Sustainability Benefits</b>	
	<b>Will the proposal:</b>	
10	<b>Improve the overall, long-term management of California groundwater resources?</b>	<b>Yes</b>
	<p>a) This project is part of an Inyo-Mono IRWM region-wide effort to better understand and manage groundwater resources in the region, which comprise the large majority of water resources to people living in and visiting the region.</p>	
	<p>b) This study is a necessary step in completing the larger project of securing a reliable and long-term water source for the Indian Wells Valley while at the same time intelligently managing groundwater resources in the basin.</p>	
11	<b>Reduce demand for net diversions for the regions from the Delta?</b>	<b>No</b>
12	<b>Provide a long-term solution in place of a short-term one?</b>	<b>Yes</b>
	<p>a) The larger goal of this effort is to secure a long-term water supply for the Indian Wells Valley. This study will make progress towards that goal</p>	

**Table 12 – Non-monetized Benefits Checklist**

<b>No.</b>	<b>Question</b>	<b>Enter “Yes”, “No” or “Neg”</b>
	through developing an improved understanding of the Indian Wells Valley groundwater basin in general as well as specific components, such as the nature of the shallow and deep aquifers and the location and quality of brackish water in the valley.	
	b) Several solutions have already been implemented in the short term that will persist into the future, but taken alone, will not solve the valley’s water supply deficit. The IWVWD has implemented such measures as a tiered water rate structure, water conservation ordinances, and public water conservation education, and is looking into increasing water recycling and procuring water through importation. This study is the next step in securing a long-term water supply for the Indian Wells Valley.	
<b>13</b>	<b>Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?</b>	<b>No</b>
<b>14</b>	<b>Improve water supply reliability in ways not quantified in Attachment 7?</b>	<b>No</b>
	a) At this point, it is not possible to quantify and assess a monetized value to how much additional water supply can be made available through brackish water treatment, but the overall goal of this study and the larger effort is to improve water supply reliability for the Indian Wells Valley.	
<b>15</b>	<b>Other (If the above listed categories do not apply, provide non-monetized benefit description)?</b>	<b>No</b>

**Table 19 – Annual Costs of Project**

(All costs should be in 2012 Dollars)

**Project: Indian Wells Valley Groundwater Basin Brackish Water Resources Study**

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost <sup>(1)</sup>	Annual Costs <sup>(2)</sup>					Discounting Calculations		
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012									1.000	
2013- 2014*	\$441,067							\$441,067	0.943	\$415,926
2014									0.890	
2015									0.840	
...									...	
...									...	
Last Year of Project Life									...	
<b>Total Present Value of Discounted Costs (Sum of column (j))</b> <b>Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries</b>										<b>\$415,926</b>
<b>Comments:</b> * Project duration is approximately 15 months. There are no annual operation or maintenance costs thereafter as this is one phase of a multi-phase effort.										

## Proposal Benefits and Cost Summary Table

Table 20 below summarizes the outcomes for each of the four project analyses. Although different approaches were used for different projects, based solely on avoided costs (benefits) resulting from reduction of burned houses in Big Pine, collectively the projects result in a greater than 1.3 benefit-cost ratio for the overall proposal (Big Pine avoided costs [benefits] of \$3,617,195/total proposal cost of \$2,636,487 = 1.37). More generally, the benefits derived from the collective proposal will address acute needs of small water systems in the region, help to identify needed water supplies, develop more robust technologies and technology transfer, support a region-wide and integrated approach to management of the region's groundwater resources, and address critical needs and livelihoods of regional disadvantaged communities and a Native American tribe.

**Table 20 – Proposal Benefits and Costs Summary**  
**Proposal: Promoting Sustainability in the Inyo-Mono Region: Understanding Regional Groundwater Resources and Upgrading Infrastructure in Disadvantaged Community Water Systems**

**Agency: Inyo County**

Project	Project Proponent	Total Present Value Project Costs <sup>(1)</sup>	Total Present Value Project Benefits			From Section D1 – Cost-Effectiveness Analysis, Cost Savings	From Section D2 – Briefly describe the main Non-monetized benefits
			From Section D3 – Monetized <sup>(2)</sup>	From Section D4 – Flood Damage Reduction <sup>(3)</sup>	Total		
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)	(h)
<b>Big Pine Fire Protection Improvement Project</b>	Big Pine Paiute Tribe; Big Pine Community Services District	\$294,189	\$3,637,195		\$3,637,195		a) Significant reduction in fire damage to households will reduce over-crowding and homelessness in addition to reducing threats to human safety; b) New fire hydrants will protect Big Pine Paiute Reservation lands and associated cultural resources while also aiding in developing more integrated and cooperative models of water management in the region; c) Reduced impacts from fires will help prevent damage to Big Pine Creek and associated fisheries via reduced ecological disturbance; d) Combined with upgrading water lines in the two systems, this project will result in additional water supply availability for fire protection purposes.

Project	Project Proponent	Total Present Value Project Costs <sup>(1)</sup>	Total Present Value Project Benefits			From Section D1 – Cost-Effectiveness Analysis, Cost Savings	From Section D2 – Briefly describe the main Non-monetized benefits
<b>Amargosa Basin Water, Ecosystem Sustainability, and Disadvantaged Communities Project</b>	Amargosa Conservancy	\$858,513					<p>a) Project will result in a more robust hydrologic model serving Amargosa Basin needs and will serve as a demonstration of technology that may be suitable for use in other locales. b) Project deliverables will provide critical information necessary to support agricultural and recreational activities that are drivers of local DAC economies. c) Project will result in fewer uncertainties about local groundwater resources which in turn will reduce local and regional conflict related to development of large-scale solar energy projects. d) Project will support continued identification of safer domestic water supplies as well as additional fire protection. e) Project will support regional collaboration amongst Inyo-Mono IRWM Program participants and project partners as well as a regional, integrated program aimed at improving groundwater resources knowledge and management.</p>

Project	Project Proponent	Total Present Value Project Costs <sup>(1)</sup>	Total Present Value Project Benefits			From Section D1 – Cost-Effectiveness Analysis, Cost Savings	From Section D2 – Briefly describe the main Non-monetized benefits
<b>Inyo County Disadvantaged Communities Meters Project</b>	Inyo County	\$966,754				\$226,267	<p>a) Installing new water meters in the three DACs will yield a more accurate measurement of actual water consumption, which will appear on ratepayers' bills and provide them with a more realistic view of their actual water use compared with the current dysfunctional meters. b) The replacement of meters in the three water systems will provide a case study of water infrastructure upgrades in small water systems. The managers of these systems will share successes and lessons learned with other small and/or disadvantaged communities, both within and outside the Inyo-Mono IRWM region, looking to upgrade water infrastructure. c) More accurate water use and billing will result in reduced conflict among ratepayers, Inyo County and LADWP while providing essential information necessary to complete a rate study and a long-term plan to fund a Capital Improvement Program. d) The project directly supports water system needs of three disadvantaged communities.</p>

Project	Project Proponent	Total Present Value Project Costs <sup>(1)</sup>	Total Present Value Project Benefits			From Section D1 – Cost-Effectiveness Analysis, Cost Savings	From Section D2 – Briefly describe the main Non-monetized benefits
<b>Indian Wells Valley Groundwater Basin Brackish Water Resources Study</b>	Indian Wells Valley Water District	\$415,926					<p>a) Project will result in increased awareness of groundwater resources and technology transfer supporting groundwater resources management in the Inyo-Mono region. b) Reduce potential conflict regarding supply, quality and location of groundwater resources. c) Implementation and findings of project will enhance cooperative and collaborative management of groundwater resources amongst vested stakeholders, including members of disadvantaged communities. d) Outcome of project will result in necessary information for planning and building of water treatment plant ultimately resulting in greater water supplies. e) Project is Phase 3 of a 5-phase project necessary for the long-term and sustainable management of groundwater supplies.</p>
<p>(1) From Table 19, or RWMG method            (2) From Table 15 or RWMG method            (3) From Table 18 or RWMG method</p>							